IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
TYLER DIVISION

CLEARVALUE, INC. AND RICHARD ALAN HAASE	§	
Plaintiffs	§	
vs.	§	**CASE NO. 6:06 CV 197**
PEARL RIVER POLYMERS, INC., POLYCHEMIE INC., SNF, INC., POLYDYNE, INC. AND SNF HOLDING COMPANY	§	
Defendants	§	

MEMORANDUM OPINION

This Claim Construction Opinion construes terms in United States Patent No. 6,120,690 ("the '690 patent").

BACKGROUND

Plaintiffs Clearvalue, Inc. and Richard Alan Haas ("Plaintiffs") allege that Defendants Pearl River Polymers, Inc.; Polychemie, Inc.; SNF, Inc.; Polydyne, Inc; and SNF Holding Company ("Defendants") infringe fifteen of the twenty-two claims of the '690 patent.[1] The '690 patent discloses what the patent refers to as "a process for clarifying waters and wastewaters by using aluminum salts and/or aluminum polymers and newly formulated high molecular weight quaternized polymers." The aluminum polymers and/or aluminum salts are combined with the high molecular weight quaternized polymers in raw water or wastewater to form a flocculated suspension, which

[1] Plaintiffs allege that Defendants infringe claims 1, 2, 3, 8, 9, 10, 12, 13, 14, 15, 17, 18, 19, 20, and 21 of the '690 patent.

causes the separation of the organic and inorganic contaminants from the water. Examples of the high molecular weight quaternized ammonium polymers include: poly di-allyl-di-methyl ammonium chloride ("DADMAC") and epichlorohydrin di-methyl amine ("Epi-DMA").

APPLICABLE LAW

"It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Innova/Pure Water Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). In claim construction, courts examine the patent's intrinsic evidence to define the patented invention's scope. *See id.*; *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 861 (Fed. Cir. 2004); *Bell Atl. Network Servs., Inc. v. Covad Commc'ns Group, Inc.*, 262 F.3d 1258, 1267 (Fed. Cir. 2001). This intrinsic evidence includes the claims themselves, the specification, and the prosecution history. *See Phillips*, 415 F.3d at 1314; *C.R. Bard, Inc.*, 388 F.3d at 861. Courts give claim terms their ordinary and accustomed meaning as understood by one of ordinary skill in the art at the time of the invention in the context of the entire patent. *Phillips*, 415 F.3d at 1312-13; *Alloc, Inc. v. Int'l Trade Comm'n*, 342 F.3d 1361, 1368 (Fed. Cir. 2003).

The claims themselves provide substantial guidance in determining the meaning of particular claim terms. *Phillips*, 415 F.3d at 1314. First, a term's context in the asserted claim can be very instructive. *Id*. Other asserted or unasserted claims can also aid in determining the claim's meaning because claim terms are typically used consistently throughout the patent. *Id*. Differences among the claim terms can also assist in understanding a term's meaning. *Id*. For example, when a dependent claim adds a limitation to an independent claim, it is presumed that the independent claim does not include the limitation. *Id*. at 1314-15. Claims "must be read in view of the specification,

of which they are a part." *Id*. at 1315. (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 978 (Fed. Cir. 1995)). "[T]he specification 'is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Id*. (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002). This is true because a patentee may define his own terms, give a claim term a different meaning than the term would otherwise possess, or disclaim or disavow the claim scope. *Phillips*, 415 F.3d at 1316. In these situations, the inventor's lexicography governs. *Id*. Also, the specification may resolve ambiguous claim terms "where the ordinary and accustomed meaning of the words used in the claims lack sufficient clarity to permit the scope of the claim to be ascertained from the words alone." *Teleflex, Inc.*, 299 F.3d at 1325. But, "although the specification may aid the court in interpreting the meaning of disputed claim language, particular embodiments and examples appearing in the specification will not generally be read into the claims." *Comark Commc'ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed. Cir. 1998); *see also Phillips*, 415 F.3d at 1323. The prosecution history is another tool to supply the proper context for claim construction because a patent applicant may also define a term in prosecuting the patent. *Home Diagnostics, Inc., v. Lifescan, Inc.*, 381 F.3d 1352, 1356 (Fed. Cir. 2004) ("As in the case of the specification, a patent applicant may define a term in prosecuting a patent.").

Although extrinsic evidence can be useful, it is "less significant than the intrinsic record in determining 'the legally operative meaning of claim language.'" *Phillips*, 415 F.3d at 1317 (quoting *C.R. Bard, Inc.*, 388 F.3d at 862). Technical dictionaries and treatises may help a court understand the underlying technology and the manner in which one skilled in the art might use claim terms, but

technical dictionaries and treatises may provide definitions that are too broad or may not be indicative of how the term is used in the patent. *Id*. at 1318. Similarly, expert testimony may aid a court in understanding the underlying technology and determining the particular meaning of a term in the pertinent field, but an expert's conclusory, unsupported assertions as to a term's definition is entirely unhelpful to a court. *Id*. Generally, extrinsic evidence is "less reliable than the patent and its prosecution history in determining how to read claim terms." *Id*.

THE '690 PATENT[2]

clarification

The parties and the Court agree that the term should be construed as "separation of solids from water by gravity sedimentation, normally aided by chemical coagulating and/or flocculating agents."

raw

The parties and the Court agree that the term should be construed as "pretreatment; before any chemicals have been added, before any processes have been applied."

water of raw alkalinity of less than or equal to 50 ppm

The parties and the Court agree that the phrase should be construed as "a raw water measuring less than or equal to 50 ppm of equivalents of Calcium Carbonate [$CaCO_3$] in solution; equivalent calcium includes Calcium [Ca], and equivalent carbonate includes Carbonate [CO_3], as well as Bicarbonate [HCO_3] and Hydroxide [OH]."

aluminum polymer

The parties and the Court agree that the term should be construed as "a polynucleate

[2] Appendix A contains the relevant claims of the patent with the disputed terms in bold.

aluminum compound, such as polyaluminum hydroxychloride, polyaluminum chloride and polyaluminum silicate sulfate (PASS), or the like."

polymer

The Court and the parties agree that the term should be construed as "a molecule composed of repeating units."

molecular weight

The Court modifies Defendants' proposed construction and construes the term as "the sum of the atomic weights of all the atoms in a molecule as measured by viscosity, osmotic pressure, light scattering, gel permeation, chromatography, ultracentrifugation, and/or similar accepted methods." Plaintiffs argue that the term "molecular weight" should be construed as "molecular weight, as used in the context of quaternized ammonium polymers, is defined within a polymer of repeating unit moiety, as a relationship between viscosity and activity of said quaternized ammonium polymer in water."

Plaintiffs argue that the '690 patent provides a clear description of the correlation between a polymer's molecular weight and its viscosity at a measured concentration in water. Plaintiffs contend that when the term "molecular weight" is used, the patent is referring to the molecular weight as determined by a particular viscosity in a solution as opposed to the "molecular weight" of the polymer as determined by any other method. In support of its proposed construction, Plaintiffs point to statements such as the one found in the abstract of the '690 patent that states "a molecular weight of greater than approximately 1,000,000 and [having] a viscosity greater than about 1,000 cps at a concentration of approximately 20% in water." Plaintiffs also point to other similar references in both the summary and description of the patent. *See* Col. 3:1-4; Col. 3:46-50; Col. 6:37-48.

Plaintiffs contend that the patentee gave the term "molecular weight" a limited and special definition by using this language in the specification. Plaintiffs further argue that those of ordinary skill in the art define and measure molecular weight using viscosity. Finally, Plaintiffs argue that the prosecution history of the '690 patent reveals that the applicant intended to limit the patent such that molecular weight was only defined in terms of viscosity. Plaintiffs point to an excerpt from an office action, which states:

> Attached at Tab C is a document which shows the correlation of molecular weight to viscosity and activity (% of solid) for Epi-DMA as summarized below:
>
> - High molecular weight Epi-DMA has a molecular weight of 500,000 to 3,000,000 defined as follows:
>
> - 500,000 - less than 1,000,000 as measured by having a viscosity of 2,000 - 9,000 cps at a concentration of approximately 50% in water.

Response to Office Action, mailed Apr. 2, 1999 at 10. Plaintiffs contend that the use of the word "defined" is strong evidence in support of their construction. Additionally, Plaintiffs point to a Clearvalue presentation in the file history of the '690 patent that contains statements such as, "This polyamine is normally of very low molecular weight (50,000 to 150,000 MW defined as 50 to 150 cps at a 50% activity in water)" in support of their argument. Clearvalue Presentation, Clarification of Water & Wastewater, filed Dec. 13, 1999.

The claim language of the '690 patent does not support Plaintiffs' proposed construction. The claims do not describe the viscosity of the polymers used in the invention but rather indicate that the high molecular weight DADMACs claimed have a molecular weight range between 1,000,000 and 3,000,000. The original claims, in the application from which the '690 patent claims priority, defined the polymer in terms of both its molecular weight and its viscosity at a certain concentration

in water. When an inventor uses different terms in the claims, it is presumed that the terms have different meanings. *See Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 448 F.3d 1324, 1333 n.3 (Fed. Cir. 2006). The original application claimed both the molecular weight and the viscosity of the polymer, therefore, it is presumed that they have different meanings. Having defined both the molecular weight and the viscosity of the polymer in the original application, the applicant clearly could have claimed the polymer only in terms of its viscosity if that was his intention. Furthermore, dependent claim 7 is the only claim that mentions viscosity, stating, "wherein said aluminum sulfate is used with said di-allyl di-methyl ammonium chloride that is 10% active at viscosities of 150 to 250 cps." However, claim 7 merely describes another characteristic of the DADMAC polymer described in claim 1 with a molecular weight of at least approximately 1,000,000 to approximately 3,000,000 when an aluminum sulfate is used in place of an aluminum salt.

Like the claim language, the specification of the '690 patent does not support Plaintiffs' proposed construction of the term "molecular weight." The specification contains no definition for molecular weight, nor does it identify a particular method that should be used to determined molecular weight. The specification contains multiple instances where the molecular weight of a polymer is given without any reference to viscosity. *See* Cols. 4:14-22, 6:53-65, 7:9-15. Although the specification does contain instances where the molecular weight of a polymer is given and then followed by its viscosity, the specification never merely states the viscosity of a polymer without also indicating the polymer's molecular weight. The specification does not describe viscosity as the method for determining the molecular weight, but as a characteristic of the "high molecular quaternized polymer." *See* Col. 3:1-4 ("The quaternized polymer has a molecular weight of greater than approximately 1,000,000 and has a viscosity greater than about 1,000 cps at a concentration of

approximately 20% in water."). Plaintiffs' argument that molecular weight should be defined in terms of viscosity contradicts the patentee's description of the quaternized polymer in terms of both its molecular weight and viscosity. Furthermore, in one instance, the specification discusses viscosity as a characteristic of raw water containing the polymer as opposed to viscosity as a measurement of the polymer in clean water.[3] Col. 3:46-50. This use of viscosity to describe the properties of raw water containing the polymer, rather than solely as a measurement technique, shows that it was understood that viscosity could be used as an indicator of parameters other than molecular weight. Accordingly, the specification of the '690 patent does not consistently use viscosity as a measure of the molecular weight of a polymer in pure water.

The specification does teach that there is a correlation between the molecular weight of a polymer and its viscosity at a particular concentration in water. *See* Col. 6:37-42. However, a correlation does not support the argument that viscosity is the same as molecular weight. Instead, such a correlation suggests to one of skill in the art that viscosity and molecular weight are distinct but related concepts.

The prosecution history of the '690 patent also fails to support Plaintiffs' proposed construction of the term "molecular weight." Although the prosecution history can be informative in construing a claim term, the claims themselves and the specification are often more useful for purposes of claim construction. *See Phillips*, 415 F.3d at 1317. The prosecution history represents an ongoing negotiation between the applicant and the Patent and Trademark Office ("PTO") and, therefore, often lacks the clarity of the specification. *Id.*

In the prosecution history of the '690 patent, the applicant continuously refers to the

[3] Raw water refers to the water being subjected to the clarification process.

molecular weight of the polymers without reference to viscosity when distinguishing the invention from the prior art and in generally describing the invention in correspondence with the PTO. The references in the prosecution history that Plaintiffs contend "define" molecular weight in terms of viscosity are not indications by the applicant that molecular weight should only be measured in terms of viscosity. During the prosecution of the application that resulted in the '690 patent, the applicant distinguished the present invention from the prior art by demonstrating that polymers falling within the recited claims provided unexpected results. The tests that supported the applicant's unexpected results did not provide the molecular weight of the polymers as recited in the claims but instead provided the polymer's viscosities at a certain concentration. The applicant argued out of necessity that there was a correlation between these viscosities and the claimed molecular weights. Accordingly, statements that certain polymers were "defined as" ranges of viscosities at stated concentrations were not intended to imply that viscosity was the only indicator or the definition of molecular weight as compared to some other measurement. Rather, such examples were meant to demonstrate that the polymers used in the test submissions had the molecular weights specified in the claims.

It is improper for the Court to read limitations from a particular embodiment into the claims, unless it is clear that the embodiment is coextensive with the invention. *JVW Enters., Inc. v. Interact Accessories, Inc.*, 424 F.3d 1324, 1335 (Fed. Cir. 2005). This rule equally applies to statements made in the prosecution history as it does to the description in the specification. *See Purdue Pharma L.P. v. Endo Pharm., Inc.*, 438 F.3d 1123, 1136 (Fed. Cir. 2006). Moreover, any disclaimer in the prosecution history must be made with reasonable clarity and deliberateness. *SuperGuide Corp. v. DirectTV Enters., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004). There is no indication in the prosecution

history that the applicant intended to limit the claim scope such that viscosity must always be used to determine the molecular weight of the polymers for the entire invention. Instead, the prosecution history demonstrates that the applicant used viscosity as a method for determining molecular weight in specific embodiments that were then used to distinguish the patented invention from the prior art.

The claim language, specification, and prosecution history of the '690 patent at most identify that there is a correlation between molecular weight and viscosity. This correlation is not disputed. However, the patent does not claim a polymer of a particular viscosity. The patent claims the use of a polymer of a particular molecular weight. Furthermore, the specification and prosecution history do not indicate that the patentee intended to limit molecular weight such that it could only be defined in terms of viscosity. Instead, the specification and prosecution history identify viscosity as a measurement that correlates to a polymer's molecular weight. However, neither indicates that the patentee intended for the term "molecular weight," as used in the claims, to be limited to measurements of molecular weight in terms of viscosity. Accordingly, the Court rejects Plaintiffs' proposed construction of the term.

Defendants contend that the term "molecular weight" should be construed as "the sum of the atomic weights of all the atoms in a molecule." Defendants rely on the definition of "molecular weight" in Hawley's Condensed Chemical Dictionary as the basis for their proposed construction. Defendants argue that "it is undisputed that this is an authoritative standard reference source for the scientific definition of 'molecular weight.'" In *Phillips*, the court stated, "We have especially noted the help technical dictionaries may provide to a court 'to better understand the underlying technology' and the way in which one of skill in the art might use the claim terms." 415 at 1318. The court further stated that technical dictionaries "have been properly recognized as among the

many tools that can assist the court in determining the meaning of particular terminology to those of skill in the art of the invention." *Id*. Here, it is helpful to reference a technical dictionary to determine the general meaning of "molecular weight" as it would be understood by one skilled in the art. Although Defendants' proposed construction provides a starting point for the construction of the term, one skilled in the art would likely understand that the molecular weight of a polymer must be determined using one of several available measurement techniques.

The parties do not dispute that molecular weight must be determined by using one of the various available measurement techniques. It is also undisputed that viscosity is one of the methods used to determine the molecular weight of the types of polymers claimed in the '690 patent. However, other methods are also available. For example, Defendants indicate that they use a method called gel permeation to measure the molecular weight during the production of polymers. Several of the prior art patents referenced in the '690 patent also refer to gel permeation as a method for measuring molecular weight. Additionally, the Court is aware of at least four other methods for measuring molecular weight, which include osmotic pressure, light scattering, chromatography, and ultracentrifugation. Other similar accepted methods may be available as well. Accordingly, the Court construes "molecular weight" as "the sum of the atomic weights of all the atoms in a molecule as measured by viscosity, osmotic pressure, light scattering, gel permeation, chromatography, ultracentrifugation, and/or similar accepted methods."

high molecular weight quaternized ammonium polymer

The Court modifies Defendants' proposed construction and construes the phrase as "a quaternized ammonium polymer having a viscosity of about 1,000 cps or greater at a concentration of about 20% in water, depending on repeating unit moiety and a molecular weight range of about

1,000,000 or greater." Relying on the same arguments they urged with regard to "molecular weight," Plaintiffs argue that the phrase should be construed as "a quaternized ammonium polymer having a viscosity of about 1,000 cps or greater at a concentration of about 20% in water, depending on repeating unit moiety." The specification clearly describes the high molecular weight quaternized polymer in terms of both its molecular weight and its viscosity. *See* Col. 3:1-4 ("The quaternized polymer has a molecular weight of greater than approximately 1,000,000 and has a viscosity greater than about 1,000 cps at a concentration of approximately 20% in water."). Plaintiffs attempt to improperly exclude the molecular weight characteristics of the high molecular weight quaternized polymer as it is described in the specification. Accordingly, and for the reasons discussed above with regard to "molecular weight," the term is construed to include a reference to its molecular weight range.

Defendants contend that the term should be construed as "a quaternized ammonium polymer having a viscosity of about 1,000 cps or greater at a concentration of about 20% in water, depending on repeating unit moiety and an average molecular weight range of about 1,000,000 or greater." Defendants argue that the term "average" should be included to prevent an alleged infringer from being found to infringe because a few of the polymers being used fall within the molecular weight range of about 1,000,000 or greater. Although this may be a concern Defendants will have to address at trial, there is no intrinsic or extrinsic evidence to support a construction that includes the word "average." Accordingly, the word "average" is not included in the construction of the phrase "high molecular weight quaternized ammonium polymer."

quaternized ammonium polymer

The parties and the Court agree that the term should be construed as "a polymer

compromising a quaternized nitrogen moiety, wherein said quaternized nitrogen moiety compromises a nitrogen atom, wherein all four atomic orbitals of said nitrogen atom are filled with an organic group."

an amount sufficient

The parties and the Court agree that the term should be construed as "a required dosage."

flocculated suspension

The parties and the Court agree that the term should be construed as "the agglomeration in water of a solid with a chemical coagulant and/or flocculent."

turbidity

The parties and the Court agree that the term should be construed as "deficient in clarity; turbidity is an expression of the optical property that causes light to be scattered and absorbed rather than transmitted with no change in direction or flux level through the water sample. In precision, sensitivity, and applicability over a wide turbidity range, the nephelometric method is preferable to visual methods. Nephelometric measurement results are reported as nephelometric units (NTUs)."

remove turbidity

The Court modifies Plaintiffs' proposed construction and construes the term as "increase clarity, reduce reported NTU to an appreciable extent." Defendants argue that the term should be construed as "to eliminate, take away, or do away with all measurable NTUs." Plaintiffs argue that the term "remove turbidity" should be construed as "increase clarity, reduce reported NTU."

Defendants contend that the ordinary meaning of "remove" is "to eliminate, or do away with." Defendants urge that Plaintiffs' proposed construction attempts to define "remove" synonymously with "reduce," meaning essentially, a lowering by any amount. Defendants contend

that such a construction would expand the scope of the claims "to cover the practice of the claimed technology where any amount of turbidity or algae was reduced." Defendants rely on the examples found in the specification of the '690 patent to support their contention that the patent claims an invention with a purpose of virtual, if not total, removal of all measurable amounts of turbidity.

A patentee may give a claim term a different meaning than the term might otherwise have, and in these situations, the inventor's lexicography controls. *Phillips*, 415 F.3d at 1316. Contrary to Defendants' argument, the claims and specification of the '690 patent appear to use the terms remove and reduce interchangeably. Claim 10 of the '690 patent is an independent claim that states, "A process for clarification of water and reduction of color and turbidity of water by chemical treatment of said water, said process comprising." Col. 17:1-3. The claim then describes the process and indicates it as "to remove color and turbidity from the water." *See* Col. 17:4-10. Claim 17 follows a similar pattern. *See* Cols. 17:44-18:21. In these examples, each of the claims use the words "remove" and "reduce" interchangeably while discussing the same process.

Similarly, the specification of the '690 patent appears to use the terms "reduce" and "remove" interchangeably and does not indicate that a complete elimination of turbidity is required under the patent. The specification uses the term "remove" in conjunction with turbidity. *See* Col. 2:46-48 ("such that removal of color units, turbidity units, oil and grease are enhanced and simplified."). Additionally, the specification uses the term "reduction" in conjunction with turbidity. *See* Col. 3:11-13 ("The present invention further provides a process for turbidity reduction . . . ."); *see also* Col. 7:40-44 (using reduction and removed synonymously).

A term that is construed to exclude a preferred embodiment found in the specification "'is rarely, if ever correct.'" *SanDisk Corp. v. Memorex Prods., Inc.*, 415 F.3d 1278, 1285 (Fed. Cir.

2005) *(*quoting *Vitronics*, 90 F.3d at 1583). None of the examples in the specification, all of which are preferred embodiments of the patent, indicate a complete elimination of all measurable NTUs of turbidity or units of color.[4] *See* Cols. 8:25-15:26. Instead, the examples demonstrate that the invention "reduces" turbidity and color to minimal but measurable amounts. *See id*. Example 10 in the specification explains that test results showed the patented chemicals to "significantly remove more color" than other chemicals. Col. 12:30-32. Example 10 goes on to explain that the color reduction was from 120 color units to 14 color units under the patented process. *See* Col. 12:32-36. Fourteen color units is clearly a measurable amount of color and does not represent a complete elimination of color. A construction of "remove turbidity" that required the elimination of all measurable turbidity or color would exclude a preferred embodiment found in the specification.

The claim language and the specification indicate that the applicant used the terms "remove" and "reduce" interchangeably. Furthermore, neither the specification nor the claims themselves indicate that all measurable NTUs of turbidity, units of color, or algae must be removed from the treated water. Accordingly, Defendants' proposed construction of "remove turbidity" is rejected.

As mentioned above, Plaintiffs argue that the term "remove turbidity" should be construed as "increase clarity, reduce reported NTU." Defendants contend that this definition improperly broadens the scope of the claim term because it allows any reduction in turbidity, even a minimal one, to be within the claims of the patent.

The specification clearly demonstrates that the patent discloses a process that improves upon previous water treatment technology. *See* Col. 8:25-15:26. The examples in the specification

[4] Turbidity is measured in units referred to as NTUs. The term "remove" is used with regard to color and turbidity throughout the patent and the parties do not dispute that the same meaning should apply with regard to "remove" irregardless of which of these terms it is used in conjunction with.

demonstrate that previous technologies removed turbidity to levels at least as low as 0.3 NTU in most cases. *See id*. Plaintiffs' proposed construction would broaden the scope of the claims such that any increase in clarity or reduction of NTUs would fall within the claims of the '690 patent. The specification clearly indicates that the scope of the claimed invention is not this broad. Accordingly, the Court construes the term "remove turbidity" as "increase clarity, reduce reported NTU to an appreciable extent."

an amount sufficient to form a flocculated suspension in the water and to remove turbidity from the water

The Court modifies Plaintiffs' proposed construction and construes the phrase as "the dosage required in the water to form a flocculated suspension and increase clarity, reduce reported NTU to an appreciable extent." Defendants argue that the phrase should be construed as "the dosage required in the water to form a flocculated suspension and to eliminate, take away, or do away with all measurable turbidity from the water." The portion of the phrase in dispute is the second half, specifically the term "remove turbidity." For the reasons discussed above with regard to "remove turbidity," the phrase is not construed to require the complete elimination of all measurable turbidity.

Plaintiffs argue that the term should be construed as "the dosage required in the water to form a flocculated suspension and to produce water of a desired clarity." As with the term "remove turbidity," Plaintiffs' proposed construction would impermissibly broaden the scope of the claim language. Accordingly, and for the same reasons discussed above, the Court construes this phrase in accordance with its construction of the term "remove turbidity."

at least an effective amount

The Court and the parties agree that the term should be construed as "a minimum dosage

required."

high molecular weight di-allyl di-methyl ammonium chloride

The Court modifies Defendants' proposed construction and construes the phrase as "a high molecular weight DADMAC measuring about 1,000 cps or greater at a concentration of about 20% in water and having a molecular weight range of about 1,000,000 or greater." Relying on the same arguments they urged with regard to "molecular weight," Plaintiffs argue that the term should be construed as "a high molecular weight DADMAC measuring about 1,000 cps or greater at a concentration of about 20% in water." For the same reasons discussed above with regard to "high molecular weight quaternized ammonium polymer" and "molecular weight," the Court rejects Plaintiffs' proposed construction.

Defendants argue that the phrase should be construed as "a high molecular weight DADMAC measuring about 1,000 cps or greater at a concentration of about 20% in water and having an average molecular weight range of about 1,000,000 or greater." For the same reasons discussed above with regard to "high molecular weight quaternized ammonium polymer," the Court does not include the word "average" in its construction of the phrase.

di-allyl di-methyl ammonium chloride (DADMAC)

The parties and the Court agree that the term should be construed as "a polymer of quaternized ammonium moiety formed by the reaction of any allyl with an amine, wherein an allyl is a substance containing the allyl group $[CH_2=CH-CH_2]+$, and wherein an amine is a derivative of ammonia $[NH_3]$ in which one or more hydrogen atoms have been replaced by an alkyl or aryl group. For example, DADMAC, DMDAAC, DAMEAC, DAEEAC, and DAMPAC are all examples of the DADMAC variety. Polymers of this variety comprise the quaternized nitrogen moiety in a branch

from the polymer backbone."

molecular weight of at least approximately 1,000,000 to approximately 3,000,000

The Court modifies Defendants' proposed construction and construes the phrase as "a high molecular weight DADMAC measuring about 1,000 cps or greater at a concentration of about 20% in water and having a molecular weight range of about 1,000,000 to approximately 3,000,000." Plaintiffs argue that the term should be construed as "a high molecular weight DADMAC measuring about 1,000 cps to about 3,000 cps at about a concentration of about 20% in water." Defendants argue that the term should be construed as "a high molecular weight DADMAC measuring about 1,000 cps or greater at a concentration of about 20% in water and having an average molecular weight range of about 1,000,000 to approximately 3,000,000." Both Plaintiffs and Defendants re-urge the arguments they set forth in support of their proposed constructions of the term "molecular weight." For the same reasons discussed above with regard to "high molecular weight quaternized ammonium polymer," the Court includes a molecular weight range and excludes the term "average" from its construction of the phrase.

poly-aluminum hydroxychloride

The parties and the Court agree that the term should be construed as "also known as aluminum chlorohydrate; an aluminum polymer formed by reacting aluminum chloride [$AlCl_3$] with a base, resulting in a product that may be expressed chemically as $Al_n(OH)_mCl_{(3n-m)}$, normally wherein the basicity is about greater than or equal to 50%."

basicity equal to or greater than 50%

The parties and the Court agree that the phrase should be construed as "a basicity of equal to or greater than 50% for an aluminum polymer may be expressed chemically as $Al_n(OH)_mCl_{(3n-m)}$,

the relative amount of hydroxyl [OH] ions compared to the amount of chloride [Cl] ions and hydroxide [OH] ions."

an alkalinity of less than 30 ppm

The parties and the Court agree that the phrase should be construed as "a raw water measuring less than or equal to 30 ppm of equivalents of Calcium Carbonate [$CaCO_3$] in solution; equivalent calcium includes Calcium [Ca], and equivalent carbonate includes Carbonate [CO_3], as well as Bicarbonate [HCO_3] and Hydroxide [OH]."

sufficient quantity

The parties and the Court agree that the term should be construed as "a required dosage."

remove algae

The Court modifies Plaintiffs' proposed construction and construes the term as "a reduction in the amount of a biological organism capable of absorbing chlorophyll A to an appreciable extent." Defendants argue that the term should be construed as "to eliminate, take away, or do away with all biological organisms capable of absorbing chlorophyll A." Defendants' arguments in support of their proposed construction are almost identical to those urged with regard to "remove turbidity." One of the few difference being that here, Defendants point to example 15 in the specification, which describes a "complete algal kill[]" in the treated water. *See* Col. 14:32-35.

For the same reasons discussed above with regard to "remove turbidity," the term "remove" is used synonymously with the term "reduce" in the '690 patent and the patent does not require the complete elimination of algae. Even in light of example 15, Defendants' proposed construction would limit the claim terms so as to exclude certain preferred embodiments discussed in the specification that do not require the complete elimination of all amounts of color or turbidity. As

mentioned above, claim terms should not be construed to exclude a preferred embodiment found in the specification, while at the same time "particular embodiments and examples appearing in the specification will not generally be read into the claims." *Comark Commc'ns, Inc.*, 156 F.3d at 1187; *see also Phillips*, 415 F.3d at 1323. Accordingly, the Court construes the term "remove algae" in a way that does not exclude a preferred embodiment found in the specification and so that no particular embodiment from the specification is improperly read into the claim.

epichlorohydrin di-methyl amine (Epi-DMA)

The parties and the Court agree that the term should be construed as "a polymer of quaternized ammonium moiety formed by the reaction of epichlorohydrin with an amine, wherein epichlorohydrin comprises a carbon [C] compound containing at least one chlorine [Cl] atom and at least three carbon [C] atoms, wherein two of said carbon atoms, which do not have a site filled with said chlorine [Cl] atom, fill a site for each other and share an oxygen [O] atom, wherein said oxygen [O] atom fills a site on each of two said carbon [C] atoms, thereby forming a triangle of said carbon [C], carbon [C], and oxygen [O] atoms. For example: Epi-DMA, Epi-MEA, Epi-EEA, Epi-MPA, etc. are all examples known in the art as being of the Epi-DMA variety. Polymers of this variety comprise the quaternized nitrogen moiety in the polymer backbone, as compared to those of DADMAC variety which comprise the quaternized nitrogen moiety in a branch from the polymer backbone."

high molecular weight epichlorohydrin d-methyl amine (Epi-DMA)

The Court modifies Defendants' proposed construction and construes the phrase as "a high molecular weight Epi-DMA having a molecular weight range of greater than about 500,000 and less than about 3,000,000 as measured by viscosity, osmotic pressure, light scattering, gel permeation,

chromatography, ultracentrifugation, and/or similar accepted methods." Since the parties have agreed on the definition of epichlorohydrin d-methyl amine (Epi-DMA), only the "high molecular weight" portion of the phrase is in dispute. Plaintiffs argue that the term should be construed as "a high-molecular weight Epi-DMA measures greater than about 1000 cps at a concentration of about 50% in water." Defendants argue that the term should be construed as "a high molecular weight Epi-DMA having a molecular weight range of greater than about 500,000 and less than about 3,000,000." Both Plaintiffs and Defendants re-urge the arguments set forth in support of their proposed constructions of the term "molecular weight." For the reasons discussed above with regard to "molecular weight," the Court rejects Plaintiffs' proposed construction and modifies Defendants' proposed construction to include various measurement techniques for determining molecular weight.

having a molecular weight of at least approximately 500,000 to approximately 3,000,000

The Court modifies Defendants' proposed construction and construes the phrase as "a high molecular weight Epi-DMA having a molecular weight range of greater than about 500,000 and less than about 3,000,000 as measure by viscosity, osmotic pressure, light scattering, gel permeation, chromatography, ultracentrifugation, and/or similar accepted methods." Plaintiffs argue that the phrase should be construed as "measuring greater than about 1,000 cps at a concentration of about 50% in water." Defendants argue that the phrase should be construed as "a high molecular weight Epi-DMA having a molecular weight range of greater than about 500,000 and less than about 3,000,000." Both Plaintiffs and Defendants re-urge the arguments set forth in support of their proposed constructions of the term "molecular weight." For the reasons discussed above with regard to "molecular weight," the Court rejects Plaintiffs' proposed construction and modifies Defendants' proposed construction to include various measurement techniques for determining molecular weight.

low molecular weight epichlorohydrin di-methyl amine (Epi-DMA)

The Court modifies Defendants' proposed construction and construes the phrase as "a low molecular weight Epi-DMA having a molecular weight range of greater than about 20,000 and less than about 500,000 as measured by viscosity, osmotic pressure, light scattering, gel permeation, chromatography, ultracentrifugation, and/or similar accepted methods." Plaintiffs argue that the phrase should be construed as "a low molecular weight Epi-DMA measures greater than about 20 cps at a concentration of about 50% in water and less than about 1,000 cps at a concentration of about 50% in water." Defendants argue that the phrase should be construed as "a low molecular weight Epi-DMA having a molecular weight range of greater than about 20,000 and less than about 500,000." Both Plaintiffs and Defendants re-urge the arguments set forth in support of their proposed constructions of the term "molecular weight." For the reasons discussed above with regard to "molecular weight," the Court rejects Plaintiffs' proposed construction and modifies Defendants' proposed construction to include various measurement techniques for determining molecular weight.

having a molecular weight of at least approximately 20,000 to 500,000

The Court modifies Defendants' proposed construction and construes the phrase as "a low molecular weight Epi-DMA having a molecular weight range of greater than about 20,000 and less than about 500,000 as measured by viscosity, osmotic pressure, light scattering, gel permeation, chromatography, ultracentrifugation, and/or similar accepted methods." Plaintiffs argue that the phrase should be construed as "measuring greater than about 20 cps at a concentration of about 50% in water and less than about 1,000 cps at a concentration of about 50% in water." Defendants argue that the phrase should be construed as "a low molecular weight Epi-DMA having a molecular weight range of greater than about 20,000 and less than about 500,000." Both Plaintiffs and Defendants re-

urge the arguments set forth in support of their proposed constructions of the term "molecular weight." For the reasons discussed above with regard to "molecular weight," the Court rejects Plaintiffs' proposed construction and modifies Defendants' proposed construction to include various measurement techniques for determining molecular weight.

low molecular weight DADMAC

The Court modifies Defendants' proposed construction and construes the phrase as "a low molecular weight DADMAC having a molecular weight range of greater than about 50,000 and less than about 1,000,000 as measured by viscosity, osmotic pressure, light scattering, gel permeation, chromatography, ultracentrifugation, and/or similar accepted methods." Plaintiffs argue that the phrase should be construed as "a low molecular weight DADMAC measures greater than about 20 cps at a concentration of about 20% in water and less than about 500 cps at a concentration of about 20% in water." Defendants argue that the phrase should be construed as "a low molecular weight DADMAC having a molecular weight range of greater than about 50,000 and less than about 1,000,000." Both Plaintiffs and Defendants re-urge the arguments set forth in support of their proposed constructions of the term "molecular weight." For the reasons discussed above with regard to "molecular weight," the Court rejects Plaintiffs' proposed construction and modifies Defendants' proposed construction to include various measurement techniques for determining molecular weight.

reduction of color

The Court and the parties agree that the term should be construed as "a lowering in the amount of measurable Pt Color Units (as defined in Standard Methods for the Examination of Water and Wastewater 20th Edition) present in water, which are often caused by the presence of tannins, lignins, and other humic substances."

reduction of turbidity

The Court and the parties agree that the term should be construed as "improving clarity, measured as reducing reported NTUs."

aluminum salt

The Court and the parties agree that the term should be construed as "a compound formed when the hydrogen of an acid is replaced by aluminum."

having a molecular weight of at least approximately 1,000,000 to approximately 3,000,000

The Court modifies Defendants' proposed construction and construes the phrase as "a high molecular weight DADMAC measuring about 1,000 cps or greater at a concentration of about 20% in water and having a molecular weight range of about 1,000,000 to approximately 3,000,000." Plaintiffs argue that the phrase should be construed as "a high molecular weight DADMAC measuring about 1,000 cps to about 3,000 cps at about a concentration of about 20% in water." Defendants argue that the phrase should be construed as "a high molecular weight DADMAC measuring about 1,000 cps or greater at a concentration of about 20% in water and having an average molecular weight range of about 1,000,000 to approximately 3,000,000." For the same reasons discussed above with regard to "high molecular weight quaternized ammonium polymer," the Court construes the phrase so that it includes a molecular weight range but does not include the word "average."

polyaluminum chloride

The Court and the parties agree that the term should be construed as "an aluminum polymer formed by reacting aluminum chloride [$AlCl_3$] with a base, resulting in a product that may be expressed chemically as $Al_n(OH)_mCl_{(3n-m)}$, normally wherein the basicity is about less than or equal

to 50%."

poly-aluminum siloxane sulfate

The Court and the parties agree that the term should be construed as "also known as polyaluminum silicate sulfate (PASS); an aluminum polymer compromising a silicate moiety and a sulfate moiety."

aluminum sulfate

The Court and the parties agree that the term should be construed as "$Al_2(SO_4)_3$; aluminum sulfate is normally provided in either a dry form or in an aqueous solution. In its dry form it is often referred to in a hydrated form, such as $(Al_2SO_4)_3$ $(18H_20)$ or $(Al_2(SO_4)_3$ $14H_2O)$."

aluminum chloride

The Court and the parties agree that the term should be construed as "$AlCl_3$; aluminum chloride is normally provided in either a dry form or in an aqueous solution. In its dry form it is often referred to in a hydrated form, such as $AlCl_3$ $6H_2O$."

any combination of an aluminum sulfate and an aluminum chloride

The Court and the parties agree that the phrase should be construed as "every possible proportion of aluminum sulfate to aluminum chloride."

alum

The Court and the parties agree that the term should be construed as "another name for aluminum sulfate, as well as aluminum ammonium sulfate and aluminum potassium sulfate."

any combination of an alum and an aluminum chloride

The Court and the parties agree that the phrase should be construed as "every possible proportion of alum to aluminum chloride."

CONCLUSION

For the foregoing reasons, the Court interprets the claim language in this case in the manner set forth above. For ease of reference, the Court's claim interpretations are set forth in a table as Appendix B. The claims with the disputed terms in bold are set forth in Appendix A.

So ORDERED and SIGNED this 17th day of July, 2006.

LEONARD DAVIS
UNITED STATES DISTRICT JUDGE

APPENDIX A

1. A process for **clarification** of **water of raw alkalinity less than or equal to 50 ppm** by chemical treatment, said process comprising:

adding to the water and, prior to or after adding to the water, blending at least one **aluminum polymer** with a high **molecular weight quaternized ammonium polymer** in **an amount sufficient to form a flocculated suspension in the water and to remove turbidity from the water**, said high **molecular weight quaternized ammonium polymer** comprising **at least an effective amount** of

high molecular weight di-allyl di-methyl ammonium chloride (DADMAC) having **a molecular weight of at least approximately 1,000,000 to approximately 3,000,000** and

said **aluminum polymer** including **at least an effective amount** of **poly-aluminum hydroxychloride** of a **basicity equal to or greater than 50%**.

2. The process for **clarification** of water according to claim 1, wherein said water has **an alkalinity of less than 30 ppm**.

3. The process for **clarification** of water according to claim 1, wherein said di-allyl di-methyl ammonium chloride is added in **sufficient quantity** to **remove algae** from said water during clarification.

8. The process of clam 1 that includes adding **high molecular weight epichlorohydrin di-methyl amine (Epi-DMA) having a molecular weight of at least approximately 500,000 to approximately 3,000,000**.

9. The process of claim 1 that includes adding **low molecular weight epichlorohydrin di-methyl amine (Epi-DMA) having a molecular weight of at least approximately 20,000 to 500,000** or **low molecular weight DADMAC**.

10. A process for **clarification** of water and **reduction of color** and **turbidity** of water by chemical treatment of said water, said process comprising:

adding to the water and, prior to or after adding to the water, blending a combination of at least one **aluminum salt** and at least one aluminum polymer with a **quaternized ammonium polymer** in **an amount sufficient** to form a **flocculated suspension** in the water and to remove color and **turbidity** from the water, said **quaternized ammonium polymer** comprising

an effective amount of high **molecular weight di-allyl di-methyl ammonium chloride (DADMAC) having a molecular weight of at least approximately 1,000,000 to**

approximately 3,000,000 and said aluminum polymer including **at least an effective amount** of **poly-aluminum hydroxy chloride**.

12. The process for **clarification** of water according to claim 10, wherein the aluminum polymer further comprises **poly-aluminum chloride** or **poly-aluminum siloxane sulfate**.

13. The process for **clarification** of water according to claim 10, wherein the **aluminum salt** comprises an **aluminum sulfate**, an aluminum chloride or **any combination of an aluminum sulfate and an aluminum chloride**.

14. The process for **clarification** of water according to claim 10, wherein said combination is blended with at least one **quaternized ammonium polymer** in **sufficient** proportion and **quantity** to **remove algae** from said water during clarification.

15. The process for **clarification** of water according to claim 10 that includes adding **low molecular weight epichlorohydrin di-methyl amine (Epi-DMA) having a molecular weight of approximately 20,000 to 500,000** or **low molecular weight DADMAC**.

17. A process for **clarification** of water and **reduction of color** and **turbidity** of water by chemical treatment of said water, said process comprising:

adding to the water and, prior to or after adding to the water, blending:

at least one **aluminum salt**, at least one aluminum polymer,
at least one high **molecular weight quaternized ammonium polymer** and either **low molecular weight epichlorohydrin di-methyl amine (Epi-DMA) having a molecular weight ranging from 20,000 to 500,000**, or **low molecular weight di-allyl di-methyl ammonium chloride (DADMAC)** having a **molecular weight** ranging from 50,000 to 1,000,000, or a combination of both,

wherein the **high molecular weight quaternized ammonium polymer** includes **at least an effective amount** of **high molecular weight di-allyl of methyl ammonium chloride (DADMAC)** having a **molecular weight of at least approximately 1,000,000 to approximately 3,000,000** and wherein the aluminum polymer includes **at least an effective amount** of **poly-aluminum hydroxy chloride** to form a **flocculated suspension** in the water and **remove turbidity** from the water.

18. The process for **clarification** of water according to claim 17, wherein said water has **an alkalinity of less than 30 ppm**.

19. The process for **clarification** of water according to claim 17, wherein the aluminum polymer further includes **poly-aluminum chloride** or **poly-aluminum siloxane sulfate**.

20. The process for **clarification** of water according to claim 17, wherein the **aluminum salt** comprises an **alum**, an aluminum chloride or **any combination of an alum and an aluminum chloride**.

21. The process for **clarification** of water according to claim 17, wherein said **aluminum salt**, said aluminum polymer, said **high molecular weight quaternized ammonium polymer** and said **low molecular weight Epi-DMA** or **DADMAC**, or said combination of **low molecular weight Epi-DMA** and **DADMAC**, are blended in sufficient proportion and quantity to **remove algae** from water during **clarification**.

APPENDIX B

CLAIM CONSTRUCTION FOR U.S. PATENT NO. 6,120,690

Claim Language	Court's Construction
clarification Claims 1, 2, 3, 10, 12, 13, 14, 15, 17, 18, 19, 20, 21	separation of solids from water by gravity sedimentation, normally aided by chemical coagulating and/or flocculating agents
raw Claim 1	pretreatment; before any chemicals have been added, before any processes have been applied
water of raw alkalinity of less than or equal to 50 ppm Claim 1	a raw water measuring less than or equal to 50 ppm of equivalents of Calcium Carbonate [$CaCO_3$] in solution; equivalent calcium includes Calcium [Ca], and equivalent carbonate includes Carbonate [CO_3], as well as Bicarbonate [HCO_3] and Hydroxide [OH]
aluminum polymer Claims 1, 10, 12, 17, 19, 21	a polynucleate aluminum compound, such as polyaluminum hydroxychloride, polyaluminum chloride and polyaluminum silicate sulfate (PASS), or the like
polymer Claim 1	a molecule composed of repeating units
molecular weight Claims 1, 8, 9, 10, 15, 17, 21	the sum of the atomic weights of all the atoms in a molecule as measured by viscosity, osmotic pressure, light scattering, gel permeation, chromatography, ultracentrifugation, and/or similar accepted methods
high molecular weight quarternized ammonium polymer Claims 1, 17, 21	a quaternized ammonium polymer having a viscosity of about 1,000 cps or greater at a concentration of about 20% in water, depending on repeating unit moiety and a molecular weight range of about 1,000,000 or greater
quaternized ammonium polymer Claims 1, 10, 14, 17, 21	a polymer compromising a quaternized nitrogen moiety, wherein said quaternized nitrogen moiety compromises a nitrogen atom, wherein all four atomic orbitals of said nitrogen atom are filled with an organic group

an amount sufficient Claims 1, 10	a required dosage
flocculated suspension Claims 1, 10, 17	the agglomeration in water of a solid with a chemical coagulant and/or flocculent
turbidity Claims 1, 10, 17	deficient in clarity; turbidity is an expression of the optical property that causes light to be scattered and absorbed rather than transmitted with no change in direction or flux level through the water sample. In precision, sensitivity, and applicability over a wide turbidity range, the nephelometric method is preferable to visual methods. Nephelometric measurement results are reported as nephelometric units (NTUs)
remove turbidity Claims 1, 17	increase clarity, reduce reported NTU to an appreciable extent
an amount sufficient to form a flocculated suspension in the water and to remove turbidity from the water Claim 1	the dosage required in the water to form a flocculated suspension and increase clarity, reduce reported NTU to an appreciable extent
at least an effective amount Claims 1, 10, 17	a minimum dosage required
high molecular weight di-allyl di-methyl ammonium chloride (DADMAC) Claims 1, 17	a high molecular weight DADMAC measuring about 1,000 cps or greater at a concentration of about 20% in water and having a molecular weight range of about 1,000,000 or greater

di-allyl di-methyl ammonium chloride (DADMAC) Claims 1, 3, 9, 10, 15, 17, 21	a polymer of quaternized ammonium moiety formed by the reaction of any allyl with an amine, wherein an allyl is a substance containing the allyl group $[CH_2=CH-CH_2]+$, and wherein an amine is a derivative of ammonia $[NH_3]$ in which one or more hydrogen atoms have been replaced by an alkyl or aryl group. For example, DADMAC, DMDAAC, DAMEAC, DAEEAC, and DAMPAC are all examples of the DADMAC variety. Polymers of this variety comprise the quaternized nitrogen moiety in a branch from the polymer backbone
molecular weight of at least approximately 1,000,000 to approximately 3,000,000 Claims 1, 17	a high molecular weight DADMAC measuring about 1,000 cps or greater at a concentration of about 20% in water and having a molecular weight range of about 1,000,000 to approximately 3,000,000
poly-aluminum hydroxychloride Claims 1, 10, 17	also known as aluminum chlorohydrate; an aluminum polymer formed by reacting aluminum chloride $[AlCl_3]$ with a base, resulting in a product that may be expressed chemically as $Al_n(OH)_mCl_{(3n-m)}$, normally wherein the basicity is about greater than or equal to 50%
basicity equal to or greater than 50% Claim 1	a basicity of equal to or greater than 50% for an aluminum polymer may be expressed chemically as $Al_n(OH)_mCl_{(3n-m)}$, the relative amount of hydroxyl [OH] ions compared to the amount of chloride [Cl] ions and hydroxide [OH] ions
an alkalinity of less than 30 ppm Claims 2, 18	a raw water measuring less than or equal to 30 ppm of equivalents of Calcium Carbonate $[CaCO_3]$ in solution; equivalent calcium includes Calcium [Ca], and equivalent carbonate includes Carbonate $[CO_3]$, as well as Bicarbonate $[HCO_3]$ and Hydroxide [OH]
sufficient quantity Claims 3, 14	a required dosage
remove algae Claims 3, 14, 21	a reduction in the amount of a biological organism capable of absorbing chlorophyll A to an appreciable extent

epichlorohydrin di-methyl amine (Epi-DMA) Claims 8, 9, 15, 17, 21	a polymer of quaternized ammonium moiety formed by the reaction of epichlorohydrin with an amine, wherein epichlorohydrin comprises a carbon [C] compound containing at least one chlorine [Cl] atom and at least three carbon [C] atoms, wherein two of said carbon atoms, which do not have a site filled with said chlorine [Cl] atom, fill a site for each other and share an oxygen [O] atom, wherein said oxygen [O] atom fills a site on each of two said carbon [C] atoms, thereby forming a triangle of said carbon [C], carbon [C], and oxygen [O] atoms. For example: Epi-DMA, Epi-MEA, Epi-EEA, Epi-MPA, etc. are all examples known in the art as being of the Epi-DMA variety. Polymers of this variety comprise the quaternized nitrogen moiety in the polymer backbone, as compared to those of DADMAC variety which comprise the quaternized nitrogen moiety in a branch from the polymer backbone
high molecular weight epichlorohydrin d-methyl amine (Epi-DMA) Claim 8	a high molecular weight Epi-DMA having a molecular weight range of greater than about 500,000 and less than about 3,000,000 as measured by viscosity, osmotic pressure, light scattering, gel permeation, chromatography, ultracentrifugation, and/or similar accepted methods
having a molecular weight of at least approximately 500,000 to approximately 3,000,000 Claim 8	a high molecular weight Epi-DMA having a molecular weight range of greater than about 500,000 and less than about 3,000,000 as measure by viscosity, osmotic pressure, light scattering, gel permeation, chromatography, ultracentrifugation, and/or similar accepted methods
low molecular weight epichlorohydrin di-methyl amine (Epi-DMA) Claims 9, 15, 17, 21	a low molecular weight Epi-DMA having a molecular weight range of greater than about 20,000 and less than about 500,000 as measured by viscosity, osmotic pressure, light scattering, gel permeation, chromatography, ultracentrifugation, and/or similar accepted methods
having a molecular weight of at least approximately 20,000 to 500,000 Claims 9, 15, 17	a low molecular weight Epi-DMA having a molecular weight range of greater than about 20,000 and less than about 500,000 as measured by viscosity, osmotic pressure, light scattering, gel permeation, chromatography, ultracentrifugation, and/or similar accepted methods

low molecular weight DADMAC Claims 9, 15, 17, 21	a low molecular weight DADMAC having a molecular weight range of greater than about 50,000 and less than about 1,000,000 as measured by viscosity, osmotic pressure, light scattering, gel permeation, chromatography, ultracentrifugation, and/or similar accepted methods
reduction of color Claims 10, 17	a lowering in the amount of measurable Pt Color Units (as defined in Standard Methods for the Examination of Water and Wastewater 20th Edition) present in water, which are often caused by the presence of tannins, lignins, and other humic substances
reduction of turbidity Claim 10	improving clarity, measured as reducing reported NTUs
aluminum salt Claims 10, 13, 17, 20, 21	a compound formed when the hydrogen of an acid is replaced by aluminum
having a molecular weight of at least approximately 1,000,000 to approximately 3,000,000 Claim 10	a high molecular weight DADMAC measuring about 1,000 cps or greater at a concentration of about 20% in water and having a molecular weight range of about 1,000,000 to approximately 3,000,000
polyaluminum chloride Claims 12, 19	an aluminum polymer formed by reacting aluminum chloride [$AlCl_3$] with a base, resulting in a product that may be expressed chemically as $Al_n(OH)_mCl_{(3n-m)}$, normally wherein the basicity is about less than or equal to 50%
poly-aluminum siloxane sulfate Claims 12, 19	also known as polyaluminum silicate sulfate (PASS); an aluminum polymer compromising a silicate moiety and a sulfate moiety
aluminum sulfate Claim 13	$Al_2(SO_4)_3$; aluminum sulfate is normally provided in either a dry form or in an aqueous solution. In its dry form it is often referred to in a hydrated form, such as $(Al_2SO_4)_3$ $(18H_20)$ or $(Al_2(SO_4)_3\ 14H_2O)$

aluminum chloride Claims 13, 20	$AlCl_3$; aluminum chloride is normally provided in either a dry form or in an aqueous solution. In its dry form it is often referred to in a hydrated form, such as $AlCl_3 \quad 6H_2O$
any combination of an aluminum sulfate and an aluminum chloride Claim 13	every possible proportion of aluminum sulfate to aluminum chloride
alum Claim 20	another name for aluminum sulfate, as well as aluminum ammonium sulfate and aluminum potassium sulfate
any combination of an alum and an aluminum chloride Claim 20	every possible proportion of alum to aluminum chloride